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EXAMINER

MOUTTET, BLAISE L

ART UNIT PAPER NUMBER

2853

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,764

Applicant(s)

HOSONO ET AL.

Examiner

Blaise L Mouttet

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on April 18, 2003 and May 19, 2003 have been entered.

Claim Objections

2. Claims 3, 5, 6, 7, 38 and 39 are objected to because "the natural period" as recited lack antecedent basis. For purposes of examination under 35 USC 102 and 35 USC 103 any time period involved in the rejection process will be considered as being "the natural period" since applicant has not specified any special meaning to "the natural period" as claimed.

Correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2853

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 14, 15, 17-29, 33 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Teramae et al. EP 1 023 997.

(It is noted by the examiner that the apparatus of claims 17-23, 27-29, 33 and 36 are product-by-process claims and as such are not materially limited to the method of manufacture steps as recited in claim 1. See MPEP 2113 regarding case law on this point. Similarly claims 14 and 15 are drawn to methods of use of the apparatus made and are not seen to be limited to the manufacturing method steps of claim 1. See MPEP 2112.02 for case law on this point.)

Teramae et al. discloses, regarding claims 14 and 15, a method of driving an inkjet recording head including a plurality of nozzle orifices (50) forming a nozzle row with associated pressure chambers (51) comprising the steps of:

providing a drive signal including wave elements having control factors which are defined in accordance with a classified rank (column 15, lines 16-40); and

supplying the drive signal to pressure generating elements (the piezoelectric elements) (column 10, lines 46-53)

wherein the drive signal is provided with an ejection element (18) for ejecting ink, a damping element (20) which follows the ejection element to damp vibration of a meniscus and a time period of the damping element is altered to change ejection characteristics (figure 8, column 16, lines 6-13).

Teramae et al. discloses, regarding claims 17, 18 and 23, an inkjet recording apparatus comprising:

an inkjet recording head as shown and described in relation to figure 3; and
a waveform controller (13) which provides a drive signal including wave elements having controlling factors which are defined in accordance with a classified rank (column 15, lines 16-40)

wherein the drive signal is provided with an ejection element (18) for ejecting ink, a damping element (20) which follows the ejection element to damp vibration of a meniscus and a time period of the damping element is altered to change ejection characteristics (figure 8, column 16, lines 6-13).

Regarding claims 19, the drive signal (figure 8) includes an expansion element (16), ejection element (18), a holding element (17) and a damping element (20) wherein the waveform controller defines the duration of the holding element (column 12, lines 20-53).

Regarding claim 20, the drive signal includes an expansion element (16), ejection element (18) and a damping element (20) wherein the waveform controller defines the duration of the damping element (column 12, lines 20-53).

Regarding claim 21 and 22, the drive signal includes an ejection element (18), a damping element (20) and a connecting element (19) wherein the waveform controller defines the duration of the connecting element (column 12, lines 20-53).

Regarding claims 24, 25 and 28, the drive signal includes an expansion element (16) and ejection element (18) wherein the waveform controller defines the duration of

the expansion and ejection elements and a duration (column 12, lines 20-53) and a potential difference (VHN) between an initial end and a termination end of the expansion element and ejection element (column 13, line 52 - column 14, line 2).

Regarding claims 26, 27 and 29, the drive signal includes an expansion element (16), holding element (17) and ejection element (18) wherein the duration of the elements is defined by the waveform controller (column 12, lines 20-53).

Regarding claims 33 and 36, the pressure generating element is a piezoelectric vibrator (40) (column 7, lines 49-58).

4. Claims 1, 2, 4, 6, 7, 9, 13, 14, 16, 17, 23-26, 31, 34, 35, 37-39 and 43 are rejected under 35 U.S.C. 102(e) as being anticipated by Anderson et al. US 6,116,717.

Anderson discloses, regarding claim 1, a method of manufacturing an inkjet recording head (figure 1) which includes a plurality of nozzle orifices forming at least one nozzle row, pressure chambers (nozzle chambers) each communicated with the associated nozzle orifice, pressure generating elements (heaters) each generating pressure fluctuation in ink provided in the associated pressure chamber to eject an ink droplet from the associated nozzle orifice (column 3, lines 7-16, column 1, lines 16-25), the method comprising the steps of:

assembling the ink jet recording head (necessary to provide the product as shown in figure 1);

executing a plurality of times individual ink drop ejections from the nozzle orifice while varying ejecting conditions including drop mass and drop velocity as shown and described in relation to figures 3 and 4, steps 170-182;

identifying a correlation between ejecting conditions and ejecting results based on the plurality of ink droplet ejections as shown and described in relation to figures 3 and 4, steps 172 and 180; and

classifying the assembled recording head into a plurality of ranks (i.e. pulsewidth offsets), based on the identified correlation as shown and described in relation to figure 4, step 184 and column 2, lines 56-63.

Regarding claims 2 and 4, the step of executing the ink droplet ejections includes the steps of:

supplying an evaluation signal including at least an excitation element which excites the ink pressure fluctuation (as shown and described as the waveform t_2 in figure 7) and an ejection element which follows the excitation element to eject the ink droplet from the nozzle orifice (as shown and described as the waveform t_4 in figure 7); and

measuring an ejected amount and ejection speed of the ink droplet at plural times as the ejecting results while varying a time period (t_3) between a termination end of the excitation element and an initial end of the ejection element as the ejecting conditions (column 5, line 59 - column 6, line 2).

Regarding claims 6, 7, 38 and 39, excitation pulse t_2 is less than half of the period of the main pulse as indicated in the resultant total row of the Table in column 7.

Regarding claim 9, the classified rank is indicated on the assembled print head by means of a memory device placed on the assembled recording head (column 5, lines 41-43).

Regarding claims 13 and 31, electrical memory is used to store the ranks (column 5, lines 41-43, column 3, lines 3-6).

Anderson et al. discloses, regarding claim 14, a method of driving the inkjet recording head comprising:

providing a drive signal including wave elements having a control factor defined in accordance with the classified rank as shown and described in relation to figure 7 and figure 5, step 192; and

supplying the drive signal to the pressure generating element as shown and described in relation to figure 5, step 194.

Regarding claims 16 and 23, a characteristics changing element of the drive signal is described in relation to column 5, line 46 - column 6, line 2.

Anderson et al. discloses, regarding claim 17, the inkjet recording head (figure 1) and a waveform controller (firing electronics) as described in relation to column 6, lines 3-25.

Regarding claim 24, the expansion element corresponds to the waveform defined by (t_2) and the ejection element corresponds to the waveform defined by (t_4) as described in relation to column 5, lines 59-66.

Regarding claim 25, the potential difference (i.e. amplitude) of the expansion and ejection elements are defined by the waveform controller (firing electronics) (figure 7, column 5, lines 46-48).

Regarding claim 26, the expansion element corresponds to the waveform defined by (t_2), the holding element corresponds to the waveform defined by (t_3) and the ejection element corresponds to the waveform defined by (t_4) as described in relation to column 5, lines 59-66.

Regarding claim 34 and 37, the pressure generating element is a heater (column 1, lines 56-60).

Regarding claims 35 and 43, the memory device of column 5, lines 41-43 corresponds to a rank indicator.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Milbrandt US 4,631,548.

Anderson et al. discloses the limitations of claims 1 and 2 as described in the 35 USC 102 rejection above.

Anderson et al. discloses, regarding claim 3, that the time period includes a first time period (t_3) which is determined such that the ink ejection becomes optimum when a natural period is per a designed criteria, a second time period (t_2) shorter than the first time period and a third time period (t_4) longer than the first time period (column 7, lines 34-50).

Anderson et al. fails to disclose that the optimal ejected ink amount is a minimum ink volume.

Milbrandt teaches the desirability of small ink volumes for optimum clarity and sharpness of an image (abstract, column 1, lines 64-68).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize a minimum ink volume as the optimum ink amount of Anderson et al. as suggested by Milbrandt.

The motivation for doing so would have been to achieve clarity and sharpness of a printed image as taught by column 1, lines 64-68 of Milbrandt.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Jacobs et al. US 4,704,675.

Anderson et al. discloses the limitations of claims 1 and 4 as described in the 35 USC 102 rejection above.

Anderson et al. discloses, regarding claim 5, that the time period includes a first time period (t_3) which is determined such that the ink ejection becomes optimum when a natural period is per a designed criteria, a second time period (t_2) shorter than the first

time period and a third time period (t_4) longer than the first time period (column 7, lines 34-50).

Anderson et al. fails to disclose that the optimal ejected ink amount is a minimum ink speed.

Jacobs et al. teaches the desirability of small ink velocities in the attainment of uniform velocity ink ejection arrays (column 1, lines 34-38, column 5, line 44-49).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize a minimum ink velocity in the optimum ink ejection of Anderson et al. as suggested by Jacobs et al.

The motivation for doing so would have been to assure uniformity in ink ejection between nozzles in the array as taught by column 1, lines 34-38 of Jacobs et al.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Nagoshi et al. US 6,224,182 and Jacobs et al. US 4,704,675.

Anderson et al. discloses classifying the assembled recording head into a plurality of ranks as explained regarding the 35 USC 102 rejection of claim 1.

Anderson et al. fails to disclose that the plurality of ranks include a first rank indicating a natural period based on a design criteria, second and third ranks respectively shorter and longer than the designed criteria and a fourth rank indicating an erroneous condition.

Nagoshi et al. discloses classifying assembled recording heads into a plurality of ranks (column 4, lines 39-48, column 4, lines 57-65) in which pulse widths are chosen to be a first rank associated with a nominal ejection period (rank 7) or other ranks based upon shorter or longer ejection periods (column 13, line 41 - column 14, line 9 and column 19, lines 16-30).

Jacobs et al. discloses classifying a recording head as a faulty head if an erroneous condition is determined (figure 6, column 5, lines 44-45).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the ranks of Nagoshi et al. in the classification procedure of Anderson et al.

The motivation for doing so would have been that finer ranks allow for higher precision classification of the recording head as suggested by column 19, lines 15-29 of Nagoshi et al.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the erroneous condition rank as suggested by Jacobs et al. in the classification procedure of Anderson et al.

The motivation for doing so would have been in order to maintain quality control on the recording head production as suggested by column 5, lines 44-45 of Jacobs et al.

8. Claims 10-12, 32 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Arthur et al. US 5,049,898.

Anderson et al. discloses the limitations of claims 1, 9, 17 and 35 as described in the 35 USC 102 rejection above.

Anderson et al. discloses the utilization of a memory device (rank indicator) to store the head rank information (column 3, lines 29-32).

Anderson et al. fails to disclose that the memory device is indicated by a symbol indicating a combination of the ranks of the nozzle rows which is readable by an optical reader.

Arthur et al. teaches that a bar code symbol indicating a combination of ranks of nozzle rows and which is readable by an optical reader is an art recognized equivalent to the memory device as taught by Anderson et al. (column 3, lines 4-16, column 6, lines 32-38).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to utilize an optically readable bar code as taught by Arthur et al. as the memory device of Anderson et al.

The motivation for doing so would have been to easily identify the operational characteristics of the print head as suggested by column 6, lines 32-40 of Arthur et al.

9. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Teramae et al. EP 1 023 997 in view of Nagoshi et al. US 6,224,182 and Jacobs et al. US 4,704,675.

Teramae et al. discloses that the assembled recording head is classified into a plurality of ranks in an EEPROM memory (column 5, lines 19-20).

Teramae et al. fails to disclose that the plurality of ranks include a first rank indicating a natural period based on a design criteria, second and third ranks respectively shorter and longer than the designed criteria and a fourth rank indicating an erroneous condition.

Nagoshi et al. discloses classifying assembled recording heads into a plurality of ranks (column 4, lines 39-48, column 4, lines 57-65) in which pulse widths are chosen to be a first rank associated with a nominal ejection period (rank 7) or other ranks based upon shorter or longer ejection periods (column 13, line 41 - column 14, line 9 and column 19, lines 16-30).

Jacobs et al. discloses classifying a recording head as a faulty head if an erroneous condition is determined (figure 6, column 5, lines 44-45).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the ranks of Nagoshi et al. in the classification procedure of Teramae et al.

The motivation for doing so would have been that finer ranks allow for higher precision classification of the recording head as suggested by column 19, lines 15-29 of Nagoshi et al.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the erroneous condition rank as suggested by Jacobs et al. in the classification procedure of Teramae et al.

The motivation for doing so would have been in order to maintain quality control on the recording head production as suggested by column 5, lines 44-45 of Jacobs et al.

Response to Arguments

10. The applicant's amendment of May 19, 2003 has overcome the prior rejections. However, the new rejections above have been necessitated by the amendment.

Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell Adams, Art Unit 2853, can be reached at (703) 308-2847. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet June 10, 2003

Bm 6/10/2003


JUDY NGUYEN
PRIMARY EXAMINER